



Test Report

No. 4026034-CH08

Date: August 26, 2016

Page 1 of 11

GrafTech International Holdings Inc.
11709 Madison Ave.
Lakewood, OH 44107
United States

The following sample(s) was/were submitted
and identified by/on behalf of the client as:

SpreaderShield with P1 plastic

Sample Received Date: 8/17/2016

Testing Period: 8/19/2016 – 8/26/2016

Test Requested : Please refer to the result summary.

Test Method & Results : Please refer to next page(s).

Result Summary :

Test Requested	Comment
1) RoHS Directive 2011/65/EU Annex II [amended by Directive (EU) 2015/863]	PASS
2) Phthalate content as requested by client	
3) Antimony content	See test results
4) Beryllium content	See test results
5) Halogen (Cl, Br, I, F) and Sulfur (S) Content of the submitted sample(s) with reference to BS EN 14582:2007	See test results
6) Annex XVII of REACH Regulation (EC) No. 1907/2006 and its amendments – Perfluorooctane sulfonates (PFOS) content (Formerly Directive 2006/122/EC)	PASS
7) Perfluorooctanoic Acid (PFOA) content	See test results

Signed for and on behalf of SGS North America, Inc.

Prepared By:

Christina Crimi
Laboratory Manager, Chemistry Laboratory

Jennifer Vaval
Laboratory Operations Supervisor, Chemistry Laboratory

"This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 45 days only."

Test Report

No. 4026034-CH08

Date: August 26, 2016

Page 2 of 11

1. RoHS Directive 2011/65/EU Annex II [amended by Directive (EU) 2015/863]

Test Item(s):	Unit	Test Method	Results 1	MDL	Limit
Cadmium(Cd)	mg/kg	With reference to IEC 62321-5:2013	ND	2	100
Lead (Pb)	mg/kg	(Determination of Cd and Pb by ICP-OES and /or ICP-MS)	3.77	2	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Hg by ICP-OES and/ or ICP-MS)	ND	2	1000
Hexavalent Chromium (CrVI)	mg/kg	With reference to IEC 62321:2008 (Determination of CrVI by UV-VIS)	ND*	2	1000
Sum of PBBs	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB and PBDE by GC-MS)	ND	-	1000
Monobromobiphenyl	mg/kg		ND	5	-
Dibromobiphenyl	mg/kg		ND	5	-
Tribromobiphenyl	mg/kg		ND	5	-
Tetrabromobiphenyl	mg/kg		ND	5	-
Hexabromobiphenyl	mg/kg		ND	5	-
Pentabromobiphenyl	mg/kg		ND	5	-
Heptabromobiphenyl	mg/kg		ND	5	-
Octabromobiphenyl	mg/kg		ND	5	-
Nonabromobiphenyl	mg/kg		ND	5	-
Decabromobiphenyl	mg/kg		ND	5	-
Sum of PBDEs	mg/kg		ND	-	1000
Monobromodiphenyl ether	mg/kg		ND	5	-
Dibromodiphenyl ether	mg/kg		ND	5	-
Tribromodiphenyl ether	mg/kg		ND	5	-
Tetrabromodiphenyl ether	mg/kg		ND	5	-
Pentabromodiphenyl ether	mg/kg		ND	5	-
Hexabromodiphenyl ether	mg/kg		ND	5	-
Heptabromodiphenyl ether	mg/kg		ND	5	-
Octabromodiphenyl ether	mg/kg		ND	5	-
Nonabromodiphenyl ether	mg/kg		ND	5	-
Decabromodiphenyl ether	mg/kg		ND	5	-
Bis (2-ethylhexyl) phthalate (DEHP)	mg/kg	CPSC-CH-C1001-09.3 (Determination of DEHP, BBP, DBP and DIBP by GC-MS)	ND	150	1000
Butyl benzyl phthalate (BBP)	mg/kg		ND	150	1000
Dibutyl phthalate (DBP)	mg/kg		ND	150	1000
Diisobutyl phthalate (DIBP)	mg/kg		ND	150	1000

Sample Description:

1. SpreaderShield with P1 plastic

"This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Document.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 45 days only."

Test Report

No. 4026034-CH08

Date: August 26, 2016

Page 3 of 11

Note :

- (a) mg/kg = ppm ; 0.1wt% = 1000ppm
- (b) ND= not detected
- (c) MDL = Method Detection Limit
- (d) - = not regulated
- (e) IEC 62321 series is equivalent to EN 62321 series
http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25

2. Phthalate content as requested by client

Method : With reference to CPSC-CH-C1001-09.3. Analysis was performed by Gas Chromatography / Mass Spectrometry.

Test Item		Result (%)	Detection Limit (%)
		1	
Di-n-hexyl phthalate	(DnHP)	ND	0.015
Diisononyl Phthalate	(DINP)	ND	0.015
Di-n-octyl Phthalate	(DNOP)	ND	0.015

Sample Description:

1. SpreaderShield with P1 plastic

- Note :**
1. % = percentage by weight
 2. ND = Not Detected

Test Report

No. 4026034-CH08

Date: August 26, 2016

Page 4 of 11

3. Antimony Content

Analyzed by Inductively Coupled Argon Plasma Spectrometry.

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Antimony (Sb)	13.2	10

Sample Description:

2. SpreaderShield with P1 plastic

Note :

1. ND = Not Detected = denoted less than reporting limit
2. 1 mg/kg = 1 ppm

4. Beryllium Content

Method: With reference to US EPA Method 3050B followed by analysis using ICP-OES and/or ICP-MS.

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Beryllium (Be)	ND	10

Sample Description:

1. SpreaderShield with P1 plastic

Note :

1. ND = Not Detected = denoted less than reporting limit

Test Report

No. 4026034-CH08

Date: August 26, 2016

Page 5 of 11

5. Halogen (Cl, Br, I, F) and Sulfur (S) content of the submitted sample(s) with reference to BS EN 14582:2007

With reference to **BS EN 14582:2007** "Characterization of waste – Halogen and sulfur content – Oxygen Combustion in closed systems and determination methods". Analysis was performed by Ion Chromatography.

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Chlorine (Cl)	ND	50
Bromine (Br)	ND	50
Fluorine (F)	763	50
Iodine (I)	ND	50

Sample Description:

1. SpreaderShield with P1 plastic

Note: 1. mg/kg = ppm

2. ND = Not Detected, reported when the reading is less than the detection limit value.

Test Report

No. 4026034-CH08

Date: August 26, 2016

Page 6 of 11

6. Annex XVII of REACH Regulation (EC) No. 1907/2006 and its amendments – Perfluorooctane sulfonates (PFOS) content (Formerly Directive 2006/122/EC)

Method : Solvent extraction followed by analysis using High-performance Liquid Chromatography-Mass Spectrophotometer (HPLC-MS).

Substances or in mixtures :

Test Item	Result (%)	Detection Limit (%)	Permissible Limit (%)
	1		
Perfluorooctane sulfonates (PFOS) [#]	ND	0.001	0.005
Comment	PASS	--	--

Sample Description:

1. SpreaderShield with P1 plastic

Note : 1. % = percentage by weight

2. ND = Not Detected

3. # = Perfluorooctane sulfonates (PFOS) are represented by sum of PFOS – Acid, PFOS – Metal Salt and PFOS – Amide.

7. Perfluorooctanoic Acid (PFOA) content

Method : With reference to SGS in-house method, solvent extraction followed by analysis using High-performance Liquid Chromatography-Mass Spectrophotometer (HPLC-MS).

Test Item	Result (%)	Detection Limit (%)
	1	
Perfluorooctanoic Acid (PFOA)	ND	0.001
Comment	--	--

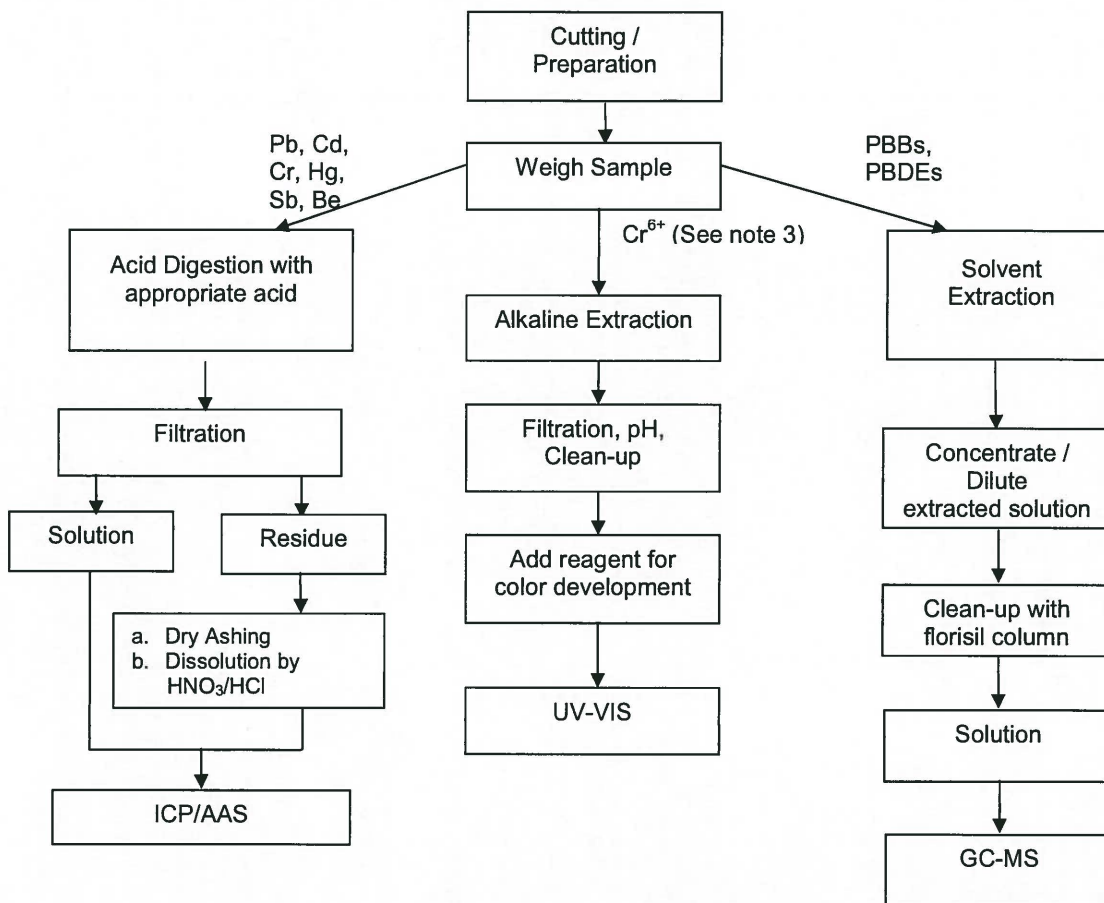
Sample Description:

1. SpreaderShield with P1 plastic

Note : 1. % = percentage by weight

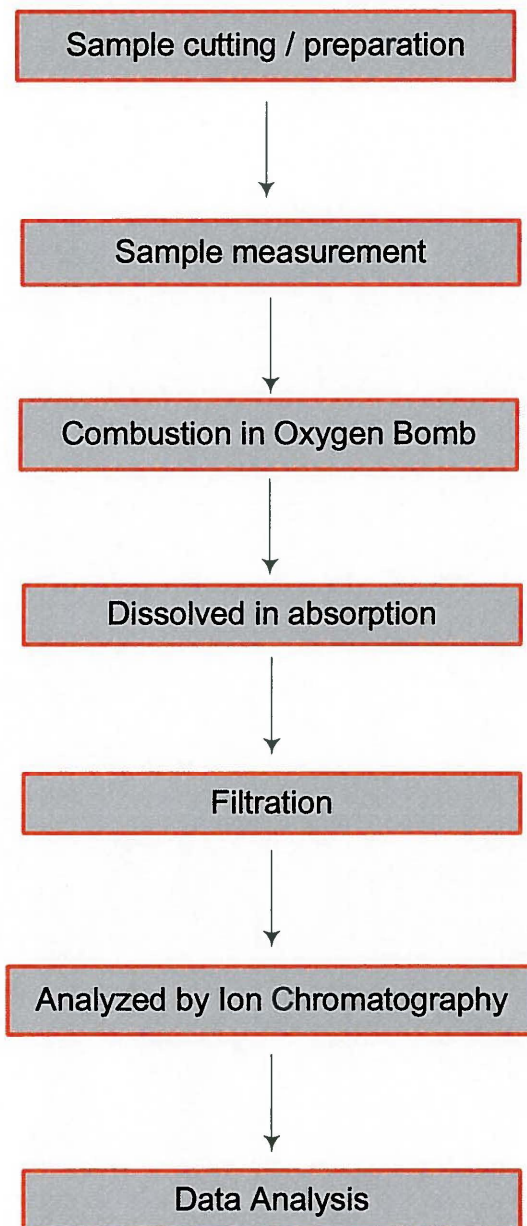
2. ND = Not Detected

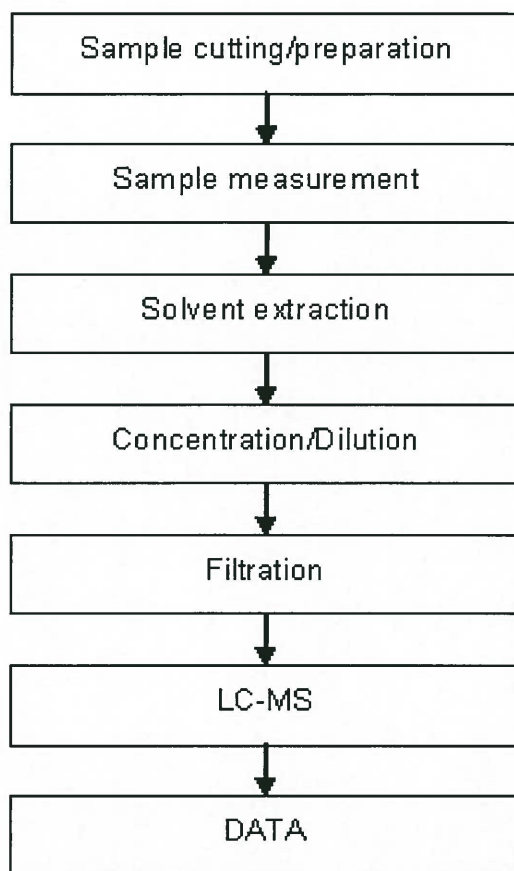
Flowchart for RoHS, Beryllium and Antimony Testing:



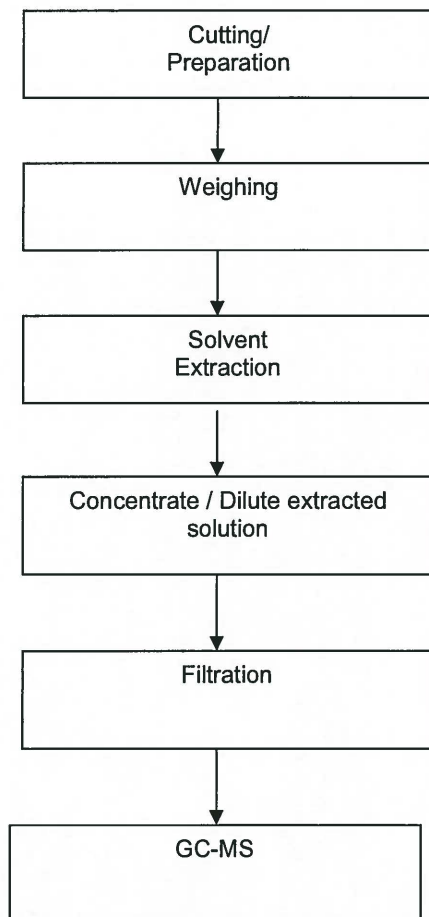
- Note : 1. For Cr(VI), spot test is adopted for metal sample.
 2. The Cd, Pb, Hg, Cr and Sb contents test on polymeric samples were dissolved totally by pre-conditioning method according to above flow chart.
 3. Cr⁶⁺ is performed only when total Cr is detected

Halogen Testing Flow Chart



PFOS/PFOA Testing Flow Chart


Flowchart for Phthalates



Sample Photo:



SGS authenticates the photo on the original report only

*** End of Report ***

"This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 45 days only."